Today’s Agenda

• Human abilities – Vision
• Human abilities – Cognition
Reminder: First Group Project Deliverable

Each group should submit a written report of “Topic definition and understanding of the problem” including:

- An introduction of the topic
- A discussion about the system/interface's purpose and requirements
  - Who are the users
  - What are the system’s major functions
  - What are the environmental conditions and constraints
- A project management plan with a Gantt Chart

Each team only needs to submit a single report

Due in Blackboard 11:59 pm EST, Sunday, Sep. 19
Reading Assignments

• Interaction Design Chapters 2, 3
• Understanding your users Chapters 1 & 2
About the Visual System

• Brightness adaptation - subjective brightness
• Brightness discrimination
  • Brightness discrimination at different intensity levels
• Perceived intensity is not a simple function of the actual intensity
• Illusory contours
• Figure & Ground
What Do We Do with All of This Visual Information?

Perception of a scene involves multiple levels of perceptual analysis.

- "Bottom up processing"
  - Data-driven
  - Sensation reaches brain, and then brain makes sense of it
- "Top down processing"
  - Cognitive functions informs our sensation
  - E.g., walking to refrigerator in middle of night
Visual Search
Visual Search

Targets vs distractors

• Average search time = \( \frac{N \times I}{2} \)
  
  • \( N \) = number of items
  • \( I \) = how much time you spend on each item

• Reduce search time:
  • Reduce \( N \)
    • Make all targets/distractors similar
  • Reduce \( I \)
    • Make each item clear
Visual Search

Parallel search vs. Serial search
Parallel Search

Find green “N”

- Search all items at once (search “at a glance”)
- Pop-out effect
- Fast
- Effortless
- Few errors
- # of distractors does not matter

What type of processing?
Bottom up!
Serial Search

Find yellow “X”
- Search every item
- Slow
- Effortful
- Error prone!
- # of distractors matters
Reducing Search Time

- Reduce search time:
  - Reduce N
  - Reduce I
- What if you can’t do that?
- Capitalize on bottom-up strategies?
  - Make target easy to locate (pop-out)
- Capitalize on top-down strategies?
  - Build on what people are familiar with
Read Flow (Related to Visual Search)
Eye Movements

Pursuit movements
• Tracking an object across the visual field
  • i.e. following the path of the mouse

Saccades
• Abrupt, short, discrete movements
  • i.e. reading
  • Used a lot as a measurement in HCI!
Saccades-Reading

Pursuit movements are almost completely automatic and generally require physically moving a stimulus. In contrast to saccades, pursuit movements are smoothly executed and are comparatively slow. Generally, they are used to track an object moving in a stationary environment; hence target velocity rather than target location is the appropriate stimulus.

Small inter-word spacing requires smaller saccades and longer fixations.
Saccades-Reading

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Read-Flow principle:

- Action items (buttons, links) should support the flow of the user in the same way as reading occurs.
- The last action should be the most-likely action to avoid backtracking.

- Left = back, stop, quit, cancel, previous
- Right = next, continue, submit
Read Flow
Some Visual Guidelines

Finally, I will leave you with some general design guidelines on human visual capabilities...
Some Visual Guidelines

1. Large font is good, so is contrast
2. Don’t use too many graphics
   • distracting and bad for screen readers
3. Something is important?
   • make it “pop” (bottom up processing) to reduce visual search
4. Simple text – easier to read and understand
5. “Color match” when you can (consistency)
Some Visual Guidelines

6. Never blur pictures
   • bad for low vision

7. Blue is hard to read
   • less blue cones in fovea

8. Group similar items

9. Use logical visual order – helps with read flow

10. Think about foreground and ground
So, Watson, you like to read, learn, hypothesize and recommend

Cartoon courtesy of Jean Paul Jacob, IBM Research Emeritus & IBMer on Campus, UC Berkeley

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Cognition

Norman’s two general modes: (ID 3.2)

• Experiential cognition
  • Perceive, act, and react
  • Effortless
  • Requires a certain level of expertise and engagement
  • E.g., driving, reading, conversation
• Reflective cognition and slow thinking
1. Information from sensory system is perceived
2. Information is processed and transformed
3. Information is responded to
Cognition

Norman’s two general modes: (ID 3.2)

• Experiential cognition

• Reflective cognition and slow thinking involving
  • Mental effort
  • Attention
  • Judgement
  • Decision making
  • New ideas and creativity, e.g., designing, learning, and writing a paper/book
Human Information Processing - Attention

- Mental effort
- Selecting sensory channels for further processing
Selective Attention

Does NOT guarantee perception

- Awareness test
  - http://www.youtube.com/watch?v=Ahg6qcgoay4
  - https://www.youtube.com/watch?v=ubNF9QNEQLA
- The “Door” study
  - http://www.youtube.com/watch?v=FWSxSQsspiQ
Quiz #2

Quiz # 2 is available in Blackboard.
Due date: 3:35pm EST, Wednesday, Sep. 15, 2021

Open book and open notes
Time to work in your groups!

Before you start...
Figure out who is taking notes.

1. Identify 3 project ideas
2. Identify for each project idea, 5 questions you may have
3. Create a Gantt Chart (I understand it is going to be vague – you can always update it)